Space Weather Forecast

Issued on Tuesday, 12 September 2023 at 13:23 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Moderate-class flares likely (R1-R2 radio blackouts). Chance of G1 Minor storms Day 1 (12 Sep).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate activity, with three Moderate-class flares observed in the last 24 hours. There are nine sunspot regions on the visible disc. The largest sunspot region was responsible for the largest observed flare, but has remained fairly stable and remains magnetically simple. A region in the north-centre disc shows some magnetic complexity and was responsible for one of the Moderate flares. Other larger regions have remained fairly stable with limited growth, with the few smaller regions currently simple and inactive.

A CME (coronal mass ejection) was observed from the southwestern disc around 11/1400 UTC, due to the eruption of a filament (line of plasma). This is expected to give a weak glancing blow at worst on Day 4 (15 Sep). Another eruption was observed on the northeast limb at 12/0948 UTC, and is awaiting imagery to see if any CME occurred, but given its location it is unlikely to be Earth-directed, pending analysis.

Solar Wind / Geomagnetic Activity: Solar wind were initially slightly elevated at first, but have since dropped to slow levels in the past 12 hours, before rising to slightly elevated again recently. The Interplanetary Magnetic Field (IMF) was mainly weak, with its north-south component also weak and variable. A recent increase in the IMF has seen moderate to strong levels, with its north-south component becoming negative (southward). Geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Moderate to Low, with further isolated Moderate flares likely.

Solar Wind / Geomagnetic Activity: There is one Earth-directed CME in the forecast as mentioned above. This may give Earth a weak glancing blow on Day 4 (15 Sep).

The solar wind and geomagnetic activity forecast is low confidence. This is due to the return of a coronal hole that would normally be expected to give a notable enhancement, remaining unobserved on the previous rotation of the Sun. This may increase solar winds on Day 1 (12 Sep) to elevated levels, and early signs are that Earth may just be coming into this influence at time of issue. A further, weaker coronal hole sourced enhancement is also expected on Day 3 or more likely into Day 4 (14-15 Sep). Consequently geomagnetic activity is forecast to become Unsettled to Active with a chance of G1 Minor Storms Day 1 (12 Sep), easing to Quiet to

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Met Office Space Weather Forecast

Unsettled Day 2 (13 Sep), before increasing again into Day 4 (15 Sep), with a chance of Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to persist at background with no solar radiation storms occurring.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	5	10	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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